

Biodiesel

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INTRODUCTION

Biodiesel is a diesel fuel substitute produced from domestic renewable resources such as vegetable oils, animal fats and recycled cooking oils, and may help to reduce our dependence on petroleum products. It is a clean-burning alternative fuel that contains no petroleum, but can be blended at any level with petroleum diesel to create biodiesel blends. It can be used in compression-ignition (diesel) engines with little or no modification. Biodiesel is easy to use, biodegradable, nontoxic, and low in sulfur.

USAGE HISTORY

In 2004, King County Metro Transit began testing the use of a 5% biodiesel blend in buses, with good results. After a successful two year trial, all county fleets began using B20 and initial results showed lower greenhouse-gas emissions. In 2007, the county made a commitment to use locally harvested canola oil for the biodiesel feedstock, for a few more cents per gallon. But by 2008, prices skyrocketed and questions arose about the product's overall environmental impacts. Prominent scientists now question whether growing crops for biofuel produces more greenhouse gases than it prevents. Prices of biodiesel have almost doubled and many experts blame biofuel production for driving up food prices worldwide.

In 2008, Metro Transit, Fleet Administration and Solid Waste Divisions purchased 915,000 gallons of B100 at a cost of \$2.8 million. In June, 2008, King County suspended the use of biodiesel, pending results of further study. The County Council put forward a motion calling for a study to examine potentially harmful biofuel impacts and the results.

Now, several years later, with a clearer understanding of clean fuels and greenhouse gas emission impacts, King County has an agreement with its fuel provider to utilize B-5 (five percent) biodiesel for bulk fuel delivery for Metro Transit and Fleet Administration if the biodiesel fuel price is equal to or less than regular diesel fuel. The Marine Division is currently using a B-10 blend for water taxi operations and alternative fuels in the County's new ferry vessels. The Marine Division worked with its fuel supplier to implement the necessary blending equipment at its Harbor Island marine fuel pier. The use of a biodiesel blend reduces GHG and sulfur dioxide emissions and diesel particulate pollution. This initiative, along with the new EPA Tier 3 marine diesel engines, allows the County's vessels to meet the strictest EPA emission standards.

King County's water taxis going green with use of biodiesel fuel



King County's water taxis are going green by switching to the use of biodiesel fuel. This will start with the vessel the Sally Fox, second the Doc Maynard; which is already operating on a locally sourced 10 percent biodiesel blend and reduces fossil fuels. The boat also has other green features such as engines that operate more cleanly and emit less particulate matter. Also the use of biodiesel will reduce particles in the air, prevent more than 140 metric tons of carbon dioxide emissions every year which is equivalent to 20 homes for a year.

BID AND CONTRACT SPECIFICATIONS

King County

King County uses the State of Washington's contract for fuels, including ULSD and biodiesel.

This contract is intended to satisfy the on-going replenishment of state's network of gasoline, heating oil, and diesel (including biodiesel) fuel storage tanks.

State of Washington Contract - Excerpts of contract ([Full text of contract #00311 \(2011\)](#))

A. Biodiesel (B100)

Biodiesel goals have been established for our customers yet the state recognizes that biodiesel is an emerging market posing significant challenges. A number of high volume co-op members have already introduced biodiesel and many other customers have expressed a desire to do so once the market matures and availability allows. The Washington State Ferries and some co-op members have very stringent biodiesel specification and mixing requirements that must be met to function properly and/or to fulfill environmental mandates. Still other customers' biodiesel specification requirements are much less stringent. Therefore, in an effort to advance the development and maturity of the biodiesel market, the state intends to offer customers two grades of biodiesel on a limited basis and broaden its use as market conditions dictate. As the biodiesel market matures, the state expects that biodiesel production will increase and become readily available. Until then, Contractors are expected to make a good faith effort to meet the state's demand for biodiesel. The state will define "B#1" and "B#2" biodiesel grades in the specification section of this IFB. Written pre-approval from the State Contract Administrator will be required before contract customers will be allowed to purchase biodiesel via this contract. Granting permission to utilize biodiesel will be based largely on market availability and the customer's readiness to transition to a biodiesel blend.

B. Biodiesel Specifications

Many of our customers have had success introducing biodiesel and are poised to increase their volume commitment as availability allows. Other high-volume customers such as City of Seattle (B20) and King County Metro Transit (B5) have more demanding emission or performance requirements dictating a more exacting and consistent specification of the highest purity so as to achieve reliable results. Should a problem arise, these customer types must have the ability to track down the source of the problem so as to rule out biodiesel as the root cause. As the biodiesel market matures, the state anticipates that biodiesel quality and reliability issues will be resolved. Until then, the state seeks to offer our customers two different biodiesel specifications (B#1 & B#2) as defined herein. The main difference is that the B#1 specification gives customers improved quality control measures whereas the B#2 specification is intended to offer customers what is readily available. It is the states expectation that the next, soon-to-be released ASTM biodiesel revision will satisfy the quality and reliability needs of most customers. At a minimum, all B#1 biodiesel must conform to the following:

1. B#1 QUALITY

Besides adhering to government and industry quality standards, the B#1 must at a minimum:

- a) Be produced by a BQ 9000 certified facility

Upon request of the purchaser, a certificate of analysis shall be provided for the B#1 ordered. The vendor shall retain this certificate for a period of 3 years. Testing will be required if any failures point to a fuel related issue, at the biodiesel providers expense. Note: The National Biodiesel Board BQ-9000 Accreditation Program has developed a system for monitoring the production, handling and distribution of biodiesel that maintains the fuel properties at the ASTM D6751 specification with rigorous requirements for sampling, testing, storage, retention of samples, blending and shipping.

- b) Be consistent in manufacture (one manufacture utilizing one feedstock)

The distributor shall take a sample of the B-100 B#1 product from each batch and seal label and store the samples for a period of 7-months. Upon request of the purchaser, the contractor shall supply the sample for testing purposes.

- c) Be free of contamination resulting in bacteria or condensation.

If bacteria are present, the appropriate treatment shall be applied to the biodiesel at their expense.

- d) Be filter-cleaned to 5 microns or less.

The B 100-B#1 must be filtered to 5 microns on transfer from storage tanks to the hauler's truck.

- e) Be virgin from a single feedstock and homogeneous

Note: The inclusion of recycled products (i.e. "yellow grease") in the manufacturing process will not be permitted for the B#1 specification.

- f) Meet or exceed ASTM-D-6751-03a Grade S15 specification

2. B#1 MINIMUM SPECIFICATIONS

Minimum specifications as shown will be met or exceeded.

Property	Test Method	Current Limits	Units
Flash point (closed cup)	D 93	130.0 min	C
Water and Sediment	D 2709	0.050 max	% volume
Kinematic Viscosity, 40°C	D 445	1.9–6.0	mm ² /s
Sulfated Ash	D 874	0.020 max	% mass
Sulfur	D 5453	0.05 max	% mass
Copper Strip Corrosion	D 130	No. 3 max	
Cetane Number	D 613	47 min	
Cloud Point	D 2500	-1°	C
Carbon Residue	D 4530	0.050 max	% mass
Acid Number	D 664	0.80 max	mg KOH/g
Free Glycerin	D 6584	0.020	% mass
Total Glycerin	D 6584	0.240	% mass
Phosphorus Content	D 4951	0.001 max	% mass
Distillation Temperature, AET, 90%	D 1160	360 max	C

Additionally, after July 1, 2006 the B100#1 is to meet or exceed the following:			
Calcium plus Magnesium		5.0 max	ppm
Sodium plus Potassium		5.0 max	ppm
Oxidation Stability	ASTM D 2274	10/100 max	mg/ml
	Or Rancimat EN 14112	1.75 min	hour
Linolenic acid concentration		12 max	% mass
Water content	Karl Fischer Moisture	500 max	ppm
Particulate contamination		24 max	mg/kg
Acid Number	ASTM D 664	0.50 max	mg KOH/g
Kinematic Viscosity, 40 oC	ASTM D 445	1.9-5.0	mm ² /s
Calcium plus Magnesium		5.0 max	ppm

3. B#1 BLENDING & HANDLING

Unless otherwise specified, the blending and handling of biodiesel must conform to the most current [Biodiesel Handling and Use Guidelines](#) as defined by the U.S. Department of Energy.

- The hauler shall blend the B100#1 with petroleum diesel as specified by the customer.
- The hauler is to load the biodiesel prior to loading the petroleum diesel.
- The B100#1 is to be transferred using clean, dedicated hoses that are properly labeled for that purpose only.
- All B100#1 transfer shall be metered into the haulers truck compartments.
- Each compartment in the haulers vehicle shall be loaded with the correct percentage of biodiesel corresponding to the blend ordered. If for example a B-20#1 blend was ordered, each compartment shall contain 20% by volume of biodiesel. Likewise, if a B-5#1 blend was ordered, each compartment shall contain 5% by volume of biodiesel.
- After the biodiesel is loaded into the haulers truck, the tanks are then to be filled with petroleum diesel so as to achieve the requested biodiesel blend ratio and to achieve proper mixing.
- Unless the customer specifies otherwise(in writing) Biodiesel is to be metered (and not measured by weight)

4. B#1 SAMPLING & TESTING

So as to rule out biodiesel as the cause of the trouble, the hauling shall obtain two samples of the delivered product upon request of the purchaser. These samples shall be retained for 7 months from the delivery date and provided to the end user upon request. The two samples shall be the following:

- A one-quart sample (unless customer specifies a smaller sample) of B-100#1 at the time the biodiesel is loaded into the hauler's tank truck.
- A one-quart sample (unless customer specifies a smaller sample) of the blended, finished product (e.g. B-20, B-5) at the time of delivery. This sample shall be taken from the middle of one of the hauler's tank truck compartments using an appropriate sample gathering device.

5. B#1 PRODUCT AGE

Biodiesel in its pure form (B-100) is known to degrade due to age. The state seeks to obtain as fresh a product as practical but in no case shall the product be older than four months from the date of manufacture.

6. BIODIESEL B#2 QUALITY

Besides adhering to government and industry quality standards, the B#2 must at a minimum:

- a) Be consistent in manufacture (one manufacture utilizing one feedstock)
- b) Be free of contamination resulting in bacteria or condensation. If bacteria are present, the biodiesel the appropriate treatment shall be applied at the contractor's expense.
- c) Be virgin from a single feed stock.
- d) Meet or exceed ASTM-D-6751-03a Grade S15 specification

7. BIODIESEL B#2 BLENDING & HANDLING

Unless otherwise specified, the blending and handling of biodiesel must conform to the most current [Biodiesel Handling and Use Guidelines](#) as defined by the U.S. Department of Energy.

- a) The hauler shall blend the B100#2 with petroleum diesel as specified by the customer.
- b) The hauler is to load the biodiesel in accordance with industry standards.
- c) All B100#2 transfers shall be metered into the haulers truck compartments.
- d) Each compartment in the haulers vehicle shall be loaded with the correct percentage of biodiesel corresponding to the blend ordered. If for example a B-20#2 blend was ordered, each compartment shall contain 20% by volume of biodiesel. Likewise, if a B-5#2 blend was ordered, each compartment shall contain 5% by volume of biodiesel.
- e) After the biodiesel is loaded into the haulers truck, the tanks are then to be filled with petroleum diesel so as to achieve the requested biodiesel blend ratio and to achieve proper mixing.
- f) Unless the customer specifies otherwise(in writing) Biodiesel is to be metered (and not measured by weight)

8. BIODIESEL B#2 PRODUCT AGE

Biodiesel in its pure form (B-100) is known to degrade due to age. The state seeks to obtain as fresh a product as practical but in no case shall the product be older than four months from the date of manufacture.

FOR MORE INFORMATION

[National Biodiesel Board](#)

[ASTM D6751 - Biodiesel Fuel Blend Stock \(B100\)](#)

[OEM Standards & Warranties - Engine Manufacturers](#)

VENDOR INFORMATION

King County's current supplier:

[Associated Petroleum](#) (800) 929-5243 supplies the following products:

[Keep full and will call](#) – contract #:511810 (based on Washington State contract #00311)

[PetroCard](#) – bulk deliveries contract #511688 (based on Washington State contract #00311)

The Contractor shall have the ability to provide unleaded gasoline, low sulfur on-road and off-road diesel fuel, ultra-low sulfur diesel fuel, and biodiesel B20 fuel. The biodiesel B20 shall be premixed and be available directly from the pump.